MCP2.8 22P CONNECTOR SPECIFICATION

				PR: Gary Zhu DATE: 2019-10-14	TE Connectivity Shanghai, China		
				CHK: Gary Zhu DATE:2019-10-14			
A	Initial Release	GZ	2019-10-14	APP: Ivan Yin DATE:2019-10-14	Document No.: 108-32304	LOC: ES	REV: A
LTR	REVISION RECORD	PR	DATE				

This controlled document is subject to change.
For latest revision and Regional Customer Service, visit our website at www.te.com

CONTENT

1. SCOPE

1.1 Content

This specification covers the performance, test and quality requirements for MCP2.8 22P connector (hereinafter referred to as MCP 22P).

This specification applies to the product 1-2356718-1 and 2356721-1, but not limited to it.

1.2 Qualification

When tests are performed, the following specifications and standards shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

2.1 Usable document

In the event of conflict between the requirements of this specification and the drawing, the drawing shall take precedent.

In the event of conflict between the requirement of this specification and the referenced documents, this specification shall take precedent.

2.2 TE specifications

109-1	General Requirements for Test Specifications
C-2356718	MCP 22P Connector
C-2356721	TPA for MCP 22P Connector
114-32246	MCP 22P Application Specification
108-18513	MCP2.8 Terminal Product Specification
114-18148	MCP2.8 Terminal Application Specification
501-32431	MCP 22P Test Report

2.3 Other specifications

Q/JLY J7110195D-2017	GEELY Connector Test Requirement (吉利汽车电线束低压连接器技术条件)
LV214 2010-4	VW Motor Vehicle Connectors Test Specification
USCAR-2 rev6	Performance Specification for Automotive Electrical Connector Systems

3. REQUIREMENT

3.1 Design and Construction

Products must meet the design, construction and physical dimensions specified in the applicable product drawings.

3.2 Material

Description of the material sees the related product drawings.

3.3 Test parameters and tolerances

Table 1: Test parameters and tolerances

Requirement	Tolerance
Ambient temperature	23℃ ± 5℃
Relative humidity	45% to 75%
Atmospheric pressure	96kPa ± 10kPa

3.4 Ratings

A. Operating Temperature: -40~85℃
B. Storage Temperature: -40~85℃
C. Rated voltage: 12V
D. Typical Application: Body Control Module

3.5 General Performance and Test description

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in Para.3.5. All testes must be performed at the test condition of the TE test specification 109-1 unless otherwise specified.

3.6 Tests requirement and method summary

3.6.1 MECHANICAL TESTS

3.6.1.1 VISUAL INSPECTION

PROCEDURE:

Inspect for defects or non-functionality. Visually examine each test specimen prior to testing and/or conditioning, noting in detail any obvious manufacturing or material defects such as cracks, tarnishing, flash, etc.

After testing and/or conditioning, re-examine each test sample and note in detail any observable changes, such as swelling, corrosion, discoloration, contact plating wear, physical distortions, cracks, loss of mechanical function evident, etc. Compare the tested and/or conditioned samples to the control samples, the videos, and/or the photographs, recording any differences in the test report.

REQUIREMENTS:

The device under test must not show any evidence of deterioration, cracks, deformities, etc. that could affect their functionality.

Refer to USCAR-2 5.4.1 or Q/JLY J7110195D-2017 5.2.1

3.6.1.2 TERMINAL TO CONNECTOR ENGAGEMENT FORCE

PROCEDURE:

TPA in open position, insert the terminal into the housing at a rate not to exceed 50mm/min, until the terminal be properly locked. Measure the peak force during insertion.

REQUIREMENTS:

For terminals with <1.0 mm^2 wire, the maximum insertion force shall be ≤15N.
For terminals with ≥1.0 mm^2 wire, the maximum insertion force shall be ≤30N.

Refer to USCAR-2 5.1.8 or Q/JLY J7110195D-2017 5.2.4

3.6.1.3 TERMINAL EXTRACTION FORCE FROM CONNECTOR

PROCEDURE:

Terminal with largest wire crimped, properly inserted into the housing, gripping the wire 100mm back edge of a terminal, pull the wire straight back at a rate of 50±10mm/min, measure the peak force until the terminal is out of the housing.

REQUIREMENTS:

Table 2: Minimum Extraction force – Terminal form housing

Tab width (mm)	Extraction Force (N)		
	Primary Lock only	Primary Lock and Secondary Lock (Moisture Condition)	Primary Lock and Secondary Lock (Thermal Aging or Humid Heat Cycle)
2.8	≥60	≥100	≥90

Refer to USCAR-2 5.4.1 or Q/JLY J7110195D-2017 5.2.6

3.6.1.4 CONNECTOR TO CONNECTOR MATING FORCE

PROCEDURE:

Using the force tester apply the appropriate force to the lever at a rate not to exceed 50mm/min. to move the lever toward the lock position.

REQUIREMENTS:

The force should be ≤75N.

Refer to USCAR-2 5.4.3 or Q/JLY J7110195D-2017 5.2.11

3.6.1.5 LOCKED CONNECTOR DISENGAGEMENT FORCE

PROCEDURE:

With the locking feature enabled, pull the connectors apart at a rate not to exceed 50mm/min using a suitable force tester and measure the peak force required to separate the connectors.

REQUIREMENTS:

Unmating force must be ≥110N with the primary connector lock fully engaged.

Refer to USCAR-2 5.4.3 or Q/JLY J7110195D-2017 5.2.13

3.6.1.6 UNLOCKED CONNECTOR DISENGAGEMENT FORCE

PROCEDURE:

With the locking feature disabled, pull the Lever to pre-lock position at a rate not to exceed 50mm/min using a suitable force tester and measure the peak force to un-mate the connectors.

REQUIREMENTS:

Unmating force must be ≤75N with the primary connector lock disabled.

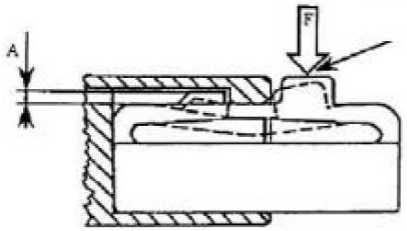
Refer to USCAR-2 5.4.3 or Q/JLY J7110195D-2017 5.2.12

3.6.1.7 RELEASE LOCK ACTUATION FORCE

PROCEDURE:

With mated connectors, apply force at the appropriate point that lever can be released not to exceed 50mm/min and record the force that required A value to zero.

Figure 1: RELEASE LOCK ACTUATION TEST



REQUIREMENTS:

The actuation force, F, is 6N<F≤51N

Refer to USCAR-2 5.4.3 or Q/JLY J7110195D-2017 5.2.10

3.6.1.8 TPA CLOSING FORCE WITH PROPERLY TERMINAL ASSEMBLED

PROCEDURE:

With Properly seated terminals, engage TPA at a rate not to exceed 50mm/min. Record the force required to completely engage the TPA.

REQUIREMENTS:

The closing force should be ≤50N

Refer to LV214 PG6

3.6.1.9 RETENTION FORCE OF SEATED TPA

PROCEDURE:

Disengage the TPA at a rate not to exceed 50mm/min. Record the force required to completely disengage the TPA

REQUIREMENTS:

TPA retention force, F, should be 10N ≤ F ≤ 50N

Refer to LV214-PG6

3.6.1.10 DROP TEST

PROCEDURE:

Lock components as applicable in the design intended shipping position. Divide samples into 3 group for test ±X, ±Y and ±Z axis orientation. Record any damage or movement/separation of components.

REQUIREMENTS:

No damage or cracks and function is normal.

Refer to USCAR-2 5.4.8

3.6.1.11 MECHANICAL SHOCK

PROCEDURE:

Take a pair of connectors with inline terminals in the plug and wire select the maximum wire diameter for terminal adaptation. Connect all holes and install them on the impact test bench.

With a semi-sine shock wave, 100g acceleration is applied in the upper, lower, left, right, front and back 6 directions, 3times in each direction, with a pulse width interval of 10ms.

REQUIREMENTS:

During vibration and mechanical shock test there must be no instance in which the resistance of any terminal pair exceeds 7.0Ω for more than 1 microsecond

Refer to Q/JLY J7110195D-2017 5.2.23

3.6.1.12 VIBRATION WITH THERMAL CYCLING

PROCEDURE:

Mount mated connectors according to connector location.
Level V1 random vibration: RMS value of acceleration 20.9m/s 2 , 24h per axis

Table 3: RAMDOM VIBRATION

F (Hz)	PSD ($(m/s^2)^2$/Hz)	PSD (g^2/Hz)
10	7	0.073
50	3.5	0.036
60	1.75	0.018
1000	0.06	0.0006

Thermal Cycling: T_{max}: 85℃, T_{min}: -40℃

Table 4: Temperature Cycle

Time (min)	Temperature (℃)
0	20
60	-40
150	-40
210	20
300	85
410	85
480	20

REQUIREMENTS:

During vibration and mechanical shock test there must be no instance in which the resistance of any terminal pair exceeds 7.0Ω for more than 1 microsecond

Refer to Q/JLY J7110195D-2017 5.2.22

3.6.2 ELECTRICAL TESTS

3.6.2.1 DRY CIRCUIT RESISTANCE

PROCEDURE:

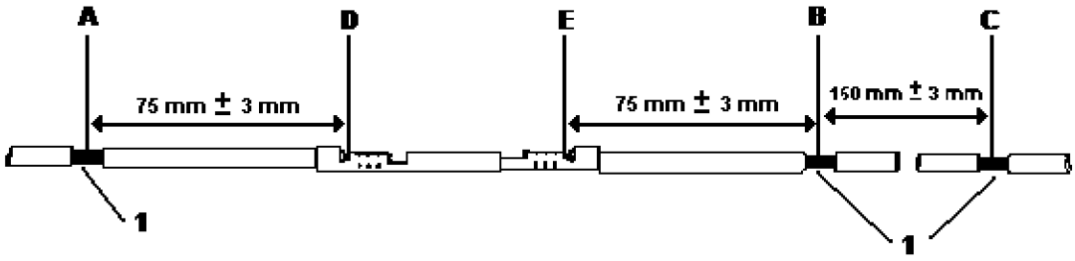
Attach micro-ohmmeter leads to locations A, B, and C as illustrated in Figure 2, to the terminated test leads.

Mate the terminated pairs. Measure the resistance across A to B and B to C using instrumentation which determines resistance by either the offset compensation or current reversal methods.

Calculate the combined resistance of the terminal conductor attachments and the interface with the following formula:

$R_{\text{Total Connection}} = R_{(DE)} = R_{(AB)} - R_{(BC)}$

Figure 2: Dry Circuit Resistance



REQUIREMENTS:

Initial Resistance ≤ 5.0 mΩ
Post Resistance ≤ 10.0 mΩ

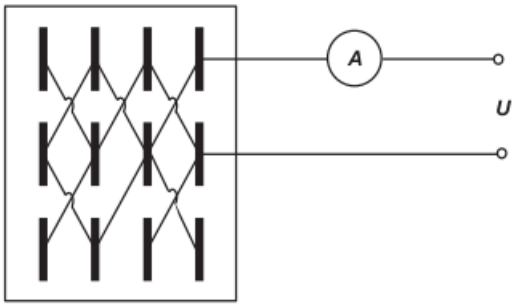
Refer to USCAR-2 5.3.1 or Q/JLY J7110195D-2017 5.2.16

3.6.2.2 ISOLATION RESISTANCE

PROCEDURE:

With mated connector pairs, apply 500VDC to adjacent terminal pairs, measure resistance 15s of stabilized reading. as illustrated in Figure 3

Figure 3 Isolation Resistance Test



REQUIREMENTS:

The resistance between every combination of two adjacent terminals must ≥100 MΩ at 500 VDC.

Refer to USCAR-2 5.5.1 or Q/JLY J7110195D-2017 5.2.19

3.6.2.3 DIELECTRIC STRENGTH

PROCEDURE:

Using the high potential (hi-pot) tester, apply an alternating current (AC) voltage of 1000 V RMS at 50 Hz or 60 Hz, or a DC voltage of 1600 V across each adjacent cavity for at least 60 seconds. Record any current leakage.

REQUIREMENTS:

No dielectric breakdown or flash-over shall occur between cavities at any time during the test. There shall be no dielectric breakdown or flash-over shall occur between the cavities and the outside of the connector at any time during the test.

Refer to or Q/JLY J7110195D-2017 5.2.20

3.6.3 ENVIRONMENTAL TESTS

3.6.3.1 THERMAL AGING

PROCEDURE:

Place samples in chamber at the maximum temperature 100℃ for a duration of 120 hours.

REQUIREMENTS:

Test samples shall meet visual examination requirements and all mechanical assists and/or other elements required to separate connectors for service shall function without breakage.

Refer to Q/JLY J7110195D-2017 5.2.26

3.6.3.2 COLD AGING

PROCEDURE:

Place samples in chamber at the minimum temperature -40℃ for a duration of 120 hours.

REQUIREMENTS:

Test samples shall meet visual examination requirements and all mechanical assists and/or other elements required to separate connectors for service shall function without breakage.

Refer to Q/JLY J7110195D-2017 5.2.27

3.6.3.3 THERMAL SHOCK

PROCEDURE:

High Temperature Duration = 30 minutes 100℃
Low Temperature Duration = 30 minutes -40℃
Perform 100 Cycles

REQUIREMENTS:

Test samples shall meet visual examination requirements and all mechanical assists and/or other elements required to separate connectors for service shall function without breakage.

Refer to Q/JLY J7110195D-2017 5.2.28

3.6.3.4 HUMIDITY HEAT CYCLE

PROCEDURE:

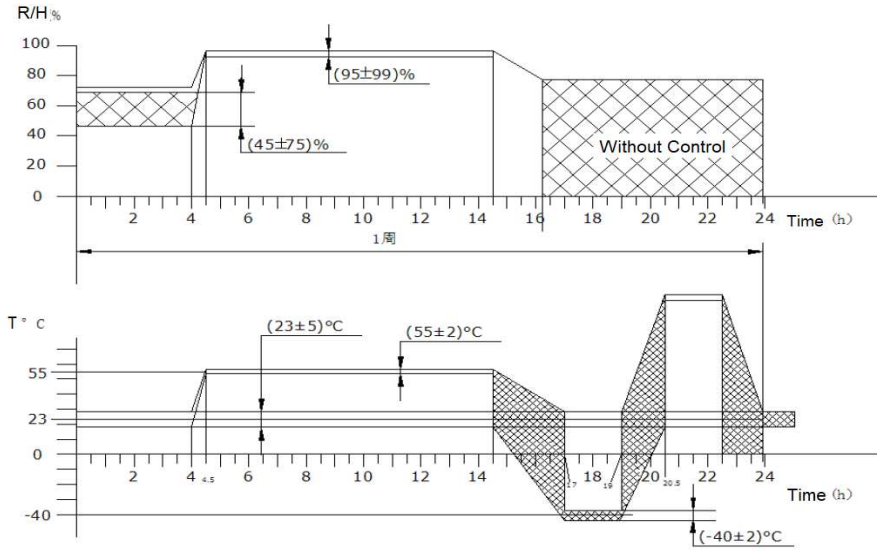
High Temperature = 100℃
Middle Temperature = 55℃
Low Temperature = -40℃
Test Duration = 10 days
As Figure 4

REQUIREMENTS:

All mechanical assists and/or other elements required to separate connectors for service shall still function without breakage.
All test samples must pass the acceptance criteria for the dry circuit resistance and visual examination tests.

Refer to Q/JLY J7110195D-2017 5.2.29

Figure 4: Humidity Heat Cycle



3.7 Test sequence

Test sequence as table 5 shown

Table 5: Test Sequence

Test No.	Item	Test Group											
		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
3.6.1.1	VISUAL INSPECTION	1,3	1,3	1,3	1,3	1,4	1,4	1,3	1,7	1,6	1,5	1,5	1,9
3.6.1.2	TERMINAL TO CONNECTOR ENGAGEMENT FORCE	2											
3.6.1.3	TERMINAL EXTRACTION FORCE FROM CONNECTOR		2							5			8
3.6.1.4	CONNECTOR TO CONNECTOR MATING FORCE			2									
3.6.1.5	LOCKED CONNECTOR DISENGAGEMENT FORCE				2								
3.6.1.6	UNLOCKED CONNECTOR DISENGAGEMENT FORCE					2							
3.6.1.7	RELEASE LOCK ACTUATION FORCE					3							
3.6.1.8	TPA CLOSING FORCE WITH PROPERLY TERMINAL ASSEMBLED						2						
3.6.1.9	RETENTION FORCE OF SEATED TPA						3						
3.6.1.10	DROP TEST							2					
3.6.1.11	MECHANICAL SHOCK								3				
3.6.1.12	VIBRATION WITH THERMAL CYCLING								5				
3.6.2.1	DRY CIRCUIT RESISTANCE								2,4,6	2,4	2,4	2,4	3,5,7
3.6.2.2	ISOLATION RESISTANCE												2
3.6.2.3	DIELECTRIC STRENGTH												6
3.6.3.1	THERMAL AGING									3			
3.6.3.2	COLD AGING										3		
3.6.3.3	THERMAL SHOCK											2	
3.6.3.4	HUMIDITY HEAT CYCLE												4
	Sample Size	10	10	5	5	5	5	18	5	6	6	6	6

4. QUALITY

4.1 Qualification test

Samples must be in accordance with drawings and be taken in a random way in the production in progress.

4.2 Requalification test

If changes significantly affecting form, fit, or function are made to the product or to the manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by product engineering.

4.3 Acceptance

Acceptance is based on verification that the product meets the requirements of section 3.6. Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmitted.

4.4 Quality conformance inspection

The applicable TE Connectivity quality inspection plan will specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification